SERVICE MANUAL

HJ RANGE OF SERVOMOTORS

ISSUE 1

WARNING

Servomotors contain magnetic material which will attract metal particles. Care should be taken when dismantling motors to avoid this.
All A.C. servomotors manufactured by SEM contain magnets which are air stable and can be dismantled without demagnetisation

SEM
controlled motor technology

HJ96

servicing instructions

1 GENERAL

1.1 Before starting work on the motor, these servicing instructions should be read and fully understood.

1.2 Servicing of SEM motors must be done only by suitably trained and qualified personnel, and only after such motors have been electrically isolated and removed from their mechanical drives.

1.3 The jaws of any vice or clamp must be suitably protected when used to grip any part of the motor.

1.4 When separating the motor end covers from the motor body, care must be taken to avoid damage to their mating surfaces.

NOTE. There are strong magnetic forces between the stator and the rotor of all SEM servomotors. Fingers should be kept clear of the gaps between the stator and end covers during assembly and disassembly of the rotor.

1.5 Dismantled components awaiting reassembly, should be kept in a safe, clean and dry location.

1.6 Various types of encoder are used, involving different procedures for dismantling, reassembly, connection, setting up and testing. Contact SEM with regard to relevant servicing procedures for the particular type of encoder involved.

2 MARKING

The following relationships must be marked with a marker pen or other suitable method before dismantling.

2.1 Drive end (DE) cover (3) to motor body (1).

2.2 Enclosing Cover (11) to non-drive end (NDE) cover (7).

2.3 Non-drive end cover to motor body.

2.4 Prior to resolver dismantling, mark outside end faces of resolver stator (14) and resolver rotor (17)

3 DISCONNECTION

If servicing work is required on the feedback connector or if the resolver stator (14) is to be completely removed, then proceed as follows: (Otherwise proceed to Section 4-Dismantling)

3.1 Undo the screws and prise off the rear cover (22) of the feedback connector, to allow access to the connector pins. If an appropriate SEM pin connection diagram is not available, record the pin positions on the connector.

3.2 Using a special pin removal tool, (available from SEM), withdraw the pins.

3.3 If it is necessary to remove the resolver stator (14) and its wiring from the motor completely; remove 4 screws (25) and remove the feedback connector housing (23) from the enclosing cover (11). Remove 4 screws (12), and, while carefully drawing the enclosing cover (11) off the NDE cover (7) draw the wiring through the hole in the enclosing cover.

4 DISMANTLING

4.1 If above procedures 3.1, 3.2. and 3.3 are not necessary, start by removing 4 screws (12) and partly drawing off enclosing cover (11), far enough to give access to the thermal sensor leads. Disconnect these leads at their in-line connector.

4.2 With the enclosing cover hanging by the wiring, remove the plastic shield (18) from the resolver. Then mark the outward facing end faces of the resolver stator (14) and resolver rotor (17) recording their relative angular positions (operation 2.4).

4.3 After removing 3 screws (15) and clamping washers 16, carefully remove the resolver stator from the NDE cover (7) and from the resolver rotor.

4.4 Remove the enclosing cover (11) together with the resolver stator (14), and the feedback connector (if still attached), taking care not to damage the wiring.

4.5 While firmly holding the motor DE shaft extension (if no brake used), unscrew and remove shaft nut (19). Then carefully remove the resolver rotor (17).

4.6 Remove the circlip (42) from the NDE shaft extension.

4.7 Remove 8 screws (4) and, while firmly holding the motor body, pull the DE cover (3) from it. Remove the wave washer (32) and the shaft seal (39) from the cover.

4.8 From the drive end, pull the motor rotor out of the motor stator, (if necessary aided by gently tapping the NDE shaft end with a small fibre mallet).

4.9 Remove 4 screws (8) and pull the NDE cover (7), complete with NDE bearing and brake stator (36) off the motor body. If a brake is used, initially pull the cover away partially to allow access to the brake leads which should then be disconnected at their in line connector. Also disconnect the earth lead from its terminal on the NDE cover.

4.10 If a brake is used, undo 3 screws (43) and detach brake stator (36) from the NDE cover (7). Otherwise undo screws (41) and remove the bearing clamp plate (35)

4.11 Using a suitable bearing extractor tool, remove the DE bearing (38) and its retaining collar (40) from the motor shaft. Remove the NDE bearing from the NDE cover.

4.12 If a brake is used, remove the brake rotor (37) from the motor shaft, (but only if necessary).

5 RE-ASSEMBLY

Note: As standard procedure during reassembly, circlip, shaft seal, all bearings and O Rings MUST be renewed to SEM specification.

5.1 Fit new O Rings (6) and (10) to DE and NDE covers respectively.

5.2 Fit new NDE bearing (33) in the NDE cover.

5.3 If a brake is used, fix its stator (36) to the inside of NDE cover (7), with brake leads uppermost, using 3 screws (43) and washers (44). Otherwise fix the bearing clamp plate (35) to the NDE cover with screws (41).

5.4 Offer the NDE cover to the motor body and reconnect the brake leads at their in-line connector. Press these leads out of harm's way. Also reconnect the earth lead to its terminal on the NDE cover.

5.5 Using 4 screws (8) and washers (9), fix the NDE cover (7) to the motor body, locating this cover in accordance with marks made in operation 2.3.

5.6 If a brake rotor (37) has been previously removed from the shaft, this rotor should be pressed back into position on the shaft.

5.7 Feed the DE bearing (38) onto its seating on the motor

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shaft. Then using a sleeve and taking care to keep the collar square to the shaft, press the collar, feed the retaining collar (40) on to the DE shaft extension and while supporting the NDE of the shaft, press this collar along the shaft until the DE bearing is hard against its shoulder on the shaft.

5.8 From the drive end, insert the motor rotor into the motor stator, locating the NDE shaft extension into the NDE bearing (33). At the same time, if a brake is used, take great care to mesh the brake stator teeth with the brake rotor teeth before the motor rotor is pressed fully into position.

5.9 Place the wave washer (32) in the bearing recess on the DE cover (3) and then feed this cover on to the DE bearing.

5.10 While locating it in accordance with marks made in operation 2.1, fix the DE cover (3) to the motor body using 8 screws (4) and washers (5). Press in a new shaft seal so that it is flush with the cover to the DE cover.

5.11 Fit a new circlip (42) into its groove alongside the NDE bearing.

5.12 Feed the resolver rotor onto the NDE shaft extension, with marks made in operation 2.4 on the outward side. Fix this rotor in position with shaft nut (19).

5.13 Feed the resolver stator (14) over the resolver rotor, with marks made in operation 2.4 on the outward side as before. Then fix this stator to the NDE cover with 3 screws (15) and their clamping washers (16) (with washer flanges on the inward side).

5.14 Offer the enclosing cover (11) to the NDE cover (7) and re-connect the thermal sensor leads to their in-line connector.

5.15 If pins have not been removed from the feedback connector, proceed to Section 6 “Resetting resolver position after re-assembly”. Otherwise proceed as follows:

5.16 Feed leads from the resolver stator and thermal sensor through the connector hole in the enclosing cover (11) and the through the connector housing (23) and gasket (24). Then re-assemble this housing on the enclosing cover.

5.17 Press pins back until they click into their previous positions in the connector socket and then reassemble this socket, its gasket (21) and its back plate onto feedback connector housing (23).

6 RESETTING THE RESOLVER.

6.1 This only applies to a standard resolver supplied by SEM with the standard setting. For any other resolver, refer to the drive manufacturer.

6.2 For these procedures it is necessary to make connections and links to feedback connector pins. To avoid damage to these pins, it is advisable to make such connections and links via a suitable separate test socket which mates with the feedback connector multi-pin plug (20) and which has short leads connected to its sockets. Alternatively appropriate pins can be made available for connections and links by withdrawing them from plug (20) as in Section 3 “Disconnection”.

6.3 If a brake is used, it must be temporarily held off during this operation by applying a 24V dc supply across the brake terminals.

6.4 Undo 4 screws (12) and pull back the enclosing cover (11) to give access to the resolver. With the above test plug connected to the feedback connector, link pins R1 to S3 & pins R2 to S2. Connect a signal generator (approx 5V 6kHz) between pins R1 and R2. Connect an AC voltmeter between pins S1 and R2.

6.5 At the power connector, link motor phase pins V and W and then connect a low voltage dc supply to motor phases at power connector pins U (+ve) and V+W (-ve). Adjust this voltage to give between 25% and 100% of motor rated current thereby causing the motor to turn to a preferred position.

6.6 Slacken the 3 screws (15) holding the resolver stator and then rotate it until the voltmeter gives a maximum reading. Reconnect the AC voltmeter to pins S4 and R2. Make a small final adjustment of the resolver stator to get a minimum reading. Retighten the screws, disconnect the test socket, the supplies, the voltmeter and links, let the brake (if used) be re-applied.

6.7 Attach the protective shield (18) to the resolver and fix the enclosing cover (11) to the NDE cover in accordance with marks made in operation 2.2.

7 ELECTRICAL TESTS NECESSARY BEFORE CONNECTING MOTOR TO AMPLIFIER

7.1 Measure motor stator winding resistances U-V, V-W, W-U. These must be equal to within 3%.

7.2 Check dielectric strength by flash test at 1000 Vac from:

a Phase U (power connector pin) U to motor body.

b Phase U to thermal sensor (feedback connector pins Thermal Sensor + and Thermal Sensor -).

c Phase U to brake connections (power connector pins B+ & B-).

If flash test is not possible then check that insulation resistance is greater than 1megaohm.

7.3 Check dielectric strength by flash test at 500Vac or with a 500Vdc supply from motor body to:

a Brake connections (power connector pins B+ and B-)

b Thermal sensor (feedback connector pins Thermal Sensor + and Thermal Sensor -)

c Resolver (feedback connector pins R2 and S1.

If flash test is not possible then check that insulation resistance is greater than 1megaohm.

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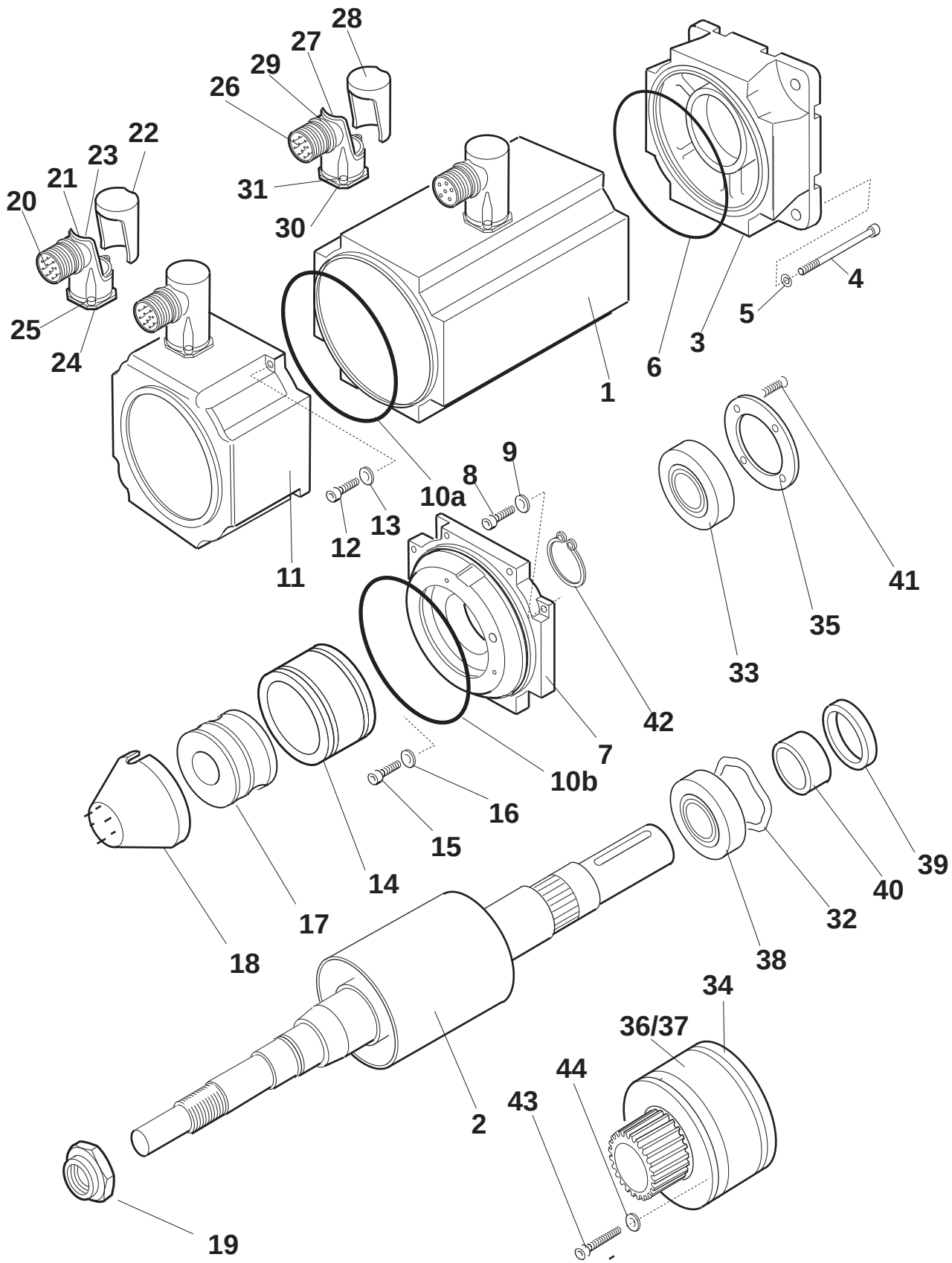

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HJ96 PARTS LIST

1. Motor Body
2. Motor Rotor
3. DE Cover
4. DE Cover fixing screws
5. Washers for DE cover fixing screws
6. DE Cover O ring
7. NDE Cover
8. NDE Cover fixing screws
9. Washers for NDE cover fixing screws
10. NDE Cover O rings
11. Enclosing Cover
12. Enclosing Cover fixing screws
13. Washers for Enclosing Cover fixing screws
14. Resolver stator
15. Resolver stator fixing screws
16. Resolver stator clamping washers
17. Resolver rotor
18. Resolver protective shield

} Note that resolver is shown but that various types of encoders may be fitted. Contact SEM for relevant servicing and setting procedures for the particular type of encoder involved.

19. Shaft nut
20. Feedback Connector multi pin receptacle
21. Feedback Connector rear gasket
22. Feedback Connector rear cover
23. Feedback Connector housing
24. Feedback Connector bottom gasket
25. Feedback Connector housing fixing screws
26. Power Connector multi pin receptacle
27. Power Connector rear gasket
28. Power Connector rear cover
29. Power Connector housing
30. Power Connector bottom gasket
31. Power Connector housing fixing screws
32. Wave Washer
33. NDE Bearing
34. Key for brake rotor
35. Bearing Clamp plate
36. Brake stator (optional)
37. Brake rotor (optional)
38. DE Bearing
39. Shaft seal
40. Retaining Collar
41. Fixing Screws for bearing clamp plate
42. Circlip
43. Fixing screws for brake stator
44. Washers for brake stator fixing screws

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HJ116

servicing instructions

1 GENERAL

1.1 Before starting work on the motor, these servicing instructions should be read and fully understood.

1.2 Servicing of SEM motors must be done only by suitably trained and qualified personnel, and only after such motors have been electrically isolated and removed from their mechanical drives.

1.3 The jaws of any vice or clamp must be suitably protected when used to grip any part of the motor.

1.4 When separating the motor end covers from the motor body, care must be taken to avoid damage to their mating surfaces.

NOTE. There are strong magnetic forces between the stator and the rotor of all SEM servomotors. Fingers should be kept clear of the gaps between the stator and end covers during assembly and disassembly of the rotor.

1.5 Dismantled components awaiting reassembly, should be kept in a safe, clean and dry location.

1.6 Various types of encoder are used, involving different procedures for dismantling, reassembly, connection, setting up and testing. Contact SEM with regard to relevant serving procedures for the particular type of encoder involved.

2 MARKING

The following relationships must be marked with a marker pen or other suitable method before dismantling.

2.1 Drive end (DE) cover (3) to motor body (1).

2.2 Enclosing Cover (11) to non-drive end (NDE) cover (7).

2.3 Non-drive end cover to motor body.

2.4 Prior to resolver dismantling, mark outside end faces of resolver stator (14) and resolver rotor (17)

3 DISCONNECTION

If servicing work is required on the feedback connector or if the resolver stator (14) is to be completely removed, then proceed as follows: (Otherwise proceed to Section 4-Dismantling)

3.1 Undo the screws and prise off the rear cover (22) of the feedback connector, to allow access to the connector pins. If an appropriate SEM pin connection diagram is not available, record the pin positions on the connector.

3.2 Using a special pin removal tool, (available from SEM), withdraw the pins.

3.3 If it is necessary to remove the resolver stator (14) and its wiring from the motor completely; remove 4 screws (25) and remove the feedback connector housing (23) from the enclosing cover (11). Remove 4 screws (12), and, while carefully drawing the enclosing cover (11) off the NDE cover (7) draw the wiring through the hole in the enclosing cover.

4 DISMANTLING

4.1 If above procedures 3.1, 3.2. and 3.3 are not necessary, start by removing 4 screws (12) and partly drawing off enclosing cover (11), far enough to give access to the thermal sensor leads. Disconnect these leads at their in-line connector

4.2 With the enclosing cover hanging by the wiring, remove the plastic shield (18) from the resolver. Then mark the outward facing end faces of the resolver stator (14) and resolver rotor (17), recording their relative angular positions (operation 2.4).

4.3 After removing 3 screws (15) and clamping washers 16, carefully remove the resolver stator from the NDE cover (7) and from the resolver rotor.

4.4 Remove the enclosing cover (11) together with the resolver stator (14), and the feedback connector (if still attached), taking care not to damage the wiring.

4.5 While firmly holding the motor DE shaft extension (if no brake used), unscrew and remove shaft nut (19). Then carefully remove the resolver rotor (17).

4.6 Remove 8 screws 4 and while firmly holding the motor body, pull out from the DE the motor rotor complete with the DE cover (3) and the brake stator (36). (if fitted). If a brake is used, initially pull the rotor partially out to give sufficient access to the brake leads. Then disconnect these leads at their in line connector.

4.7 Remove 6 screws (41) holding the bearing clamp plate (35) to the DE cover, then pull this cover away from the clamp plate or from the brake and off the DE bearing. Remove the shaft seal (39) and O Ring (6) from the DE cover.

4.8 Using a suitable bearing extractor tool, remove the DE bearing and its retaining collar (40) from the shaft. Similarly remove the NDE bearing.

4.9 Remove the bearing clamping plate (35) or the brake stator from the motor rotor and (only if necessary) remove the brake rotor from the shaft.

4.10 Remove 4 screws (8) and pull back the NDE cover (7) from the motor body. Disconnect the earth lead at its terminal on this cover and carefully avoid damage to leads passing through this cover. Remove O Ring (10) and wave washers (32) from this cover.

5 RE-ASSEMBLY.

Note: As standard procedure during reassembly, circlip, shaft seal and all bearings, and O Rings MUST be renewed to SEM specification.

5.1 Fit new O Rings (6) and (10) to DE and NDE covers respectively.

5.2 Fit new DE bearing (38) onto the bearing recess in DE cover (3)

5.3 Fix brake stator (36) (if used) to the DE cover, with brake leads uppermost, using 6 long screws (43) and washers (44) to clamp the bearing.

5.4 If no brake is fitted, fix bearing clamp plate (35) to the DE cover with screws (41) and washers (42).

5.5 If a brake rotor has previously been removed from the shaft, it should be pressed back onto the shaft next.

5.6 While holding the motor shaft vertically, with the DE uppermost, feed the DE bearing (38) onto its seating on the shaft. At the same time, if a brake is used, carefully mesh the brake stator teeth with the brake rotor teeth and gently press the brake stator into position.

5.7 Using a sleeve and taking care to keep the collar square to the shaft, press the collar, feed the retaining collar (40) onto the DE shaft extension and while supporting the

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NDE of the shaft, press this collar along the shaft until the DE bearing (38) is hard against its shoulder on the shaft. Also fit NDE bearing to the shaft.

5.8 Offer the NDE cover to the motor body and reconnect thermal sensor leads at their in line connector. Also reconnect the earth lead to its terminal on the cover.

5.9 Fix the NDE cover (7) to the motor body with 4 screws (8) and washers (9)

5.10 Place two wave washers (32) in the bearing recess in the NDE cover (a smear of grease or a tilting of the motor body will hold them in position).

5.11 If no brake is used, fully insert the motor rotor into the drive end of the motor stator, carefully locating the NDE bearing (33) into the recess in the NDE cover.

5.12 If a brake is used, partially insert the motor rotor into the motor stator, leaving adequate access to the brake connections. Reconnect these leads at their inline connector and press them into a safe position. The fully insert the motor rotor into the motor stator, carefully locating the NDE bearing (33) into the bearing recess in the NDE cover.

5.13 Locate the DE cover in accordance with marks made in operation 2.1 and fix this cover to the motor body with 8 screws (4) and washers (5).

5.14 Feed resolver rotor (17) on to the NDE shaft extension, with marks made in operation 2.4 on the outward side as before. Then fix this rotor in position with the shaft nut (19).

5.15 Feed the resolver stator (14) over the resolver rotor, with marks made in operation 2.4 on outward side as before. Then fix the stator to the NDE cover (7) with screws (15) and their clamping washers (16) (with washer flanges on the inward side).

5.16 Re-connect the thermal sensor leads at their in line connector.

5.17 If pins have not been removed from the feedback connector, proceed to section 6 - “Resetting resolver position after re-assembly”. Otherwise if pins have been removed, proceed as follows:

5.18 Feed leads from the resolver stator and from the thermal sensor through the connector hole on enclosing cover (11). Then feed this wiring through connector housing (23) and gaskets (24) and reassemble this housing onto enclosing cover (11)

5.19 Press the pins back until they click into their previous positions in connector plug (20). then fix this plug, gasket 921) and rear cover (22) on to housing (23).

6 RESETTING THE RESOLVER.

6.1 **This only applies to a standard resolver supplied by SEM with the standard setting. For any other resolver, refer to the drive manufacturer**.

6.2 For these procedures it is necessary to make connections and links to feedback connector pins. To avoid damage to these pins, it is advisable to make such connections and links via a suitable separate test socket which mates with the feedback connector multi-pin plug (20) and which has short leads connected to its sockets. Alternatively appropriate pins can be made available for connections and links by withdrawing them from plug (20) as in Section 3 “Disconnection”.

6.3 If a brake is used, it must be temporarily held off during this operation by applying a 24V dc supply across the brake terminals.

6.4 Undo 4 screws (12) and pull back the enclosing cover (11) to give access too the resolver.

6.5 With the above test plug connected to the feedback connector, link pins R1 to S3 & pins R2 to S2. Connect a signal generator (approx 5V 6kHz) between pins R1 and R2. Connect an AC voltmeter between pins S1 and R2

6.6 At the power connector, link motor phase pins V and W and then connect a low voltage dc supply to motor phases at power connector pins U (+ve) and V+W (-ve). Adjust this voltage to give between 25% and 100% of motor rated current thereby causing the motor to turn to a preferred position.

6.7 Slacken the 3 screws (15) holding the resolver stator and then rotate it until the voltmeter gives a maximum reading. Reconnect the AC voltmeter to pins S4 and R2. Make a small final adjustment of the resolver stator to get a minimum reading. Retighten the screws, disconnect the test socket, the supplies, the voltmeter and links, let the brake (if used) be re-applied.

6.8 Attach the protective shield (18) to the resolver and fix the enclosing cover (11) to the NDE cover in accordance with marks made in operation 2.2.

7 ELECTRICAL TESTS NECESSARY BEFORE CONNECTING MOTOR TO AMPLIFIER:

7.1 Measure motor stator winding resistances U-V, VW, W-U. These must be equal to within 3%.

7.2 Check dielectric strength by flash test at 1000 Vac from:

a Phase U (power connector pin) U to motor body.

b Phase U to thermal sensor (feedback connector pins Thermal Sensor + and Thermal Sensor -

c Phase U to brake connections (power connector pins B+ and B-).

If flash test is not possible then check that insulation resistance is greater than 1megaohm.

7.3 Check dielectric strength by flash test at 500v dc supply or with a 500V megger from motor body to:

a Brake connections B + B - (power connector pins + and -)

b Thermal sensor (feedback connector pins Thermal sensor + and Thermal Sensor -).

c Resolver (feedback connector pins R2 and R1)

If flash test is not possible then check that insulation resistance is greater than 1megaohm.

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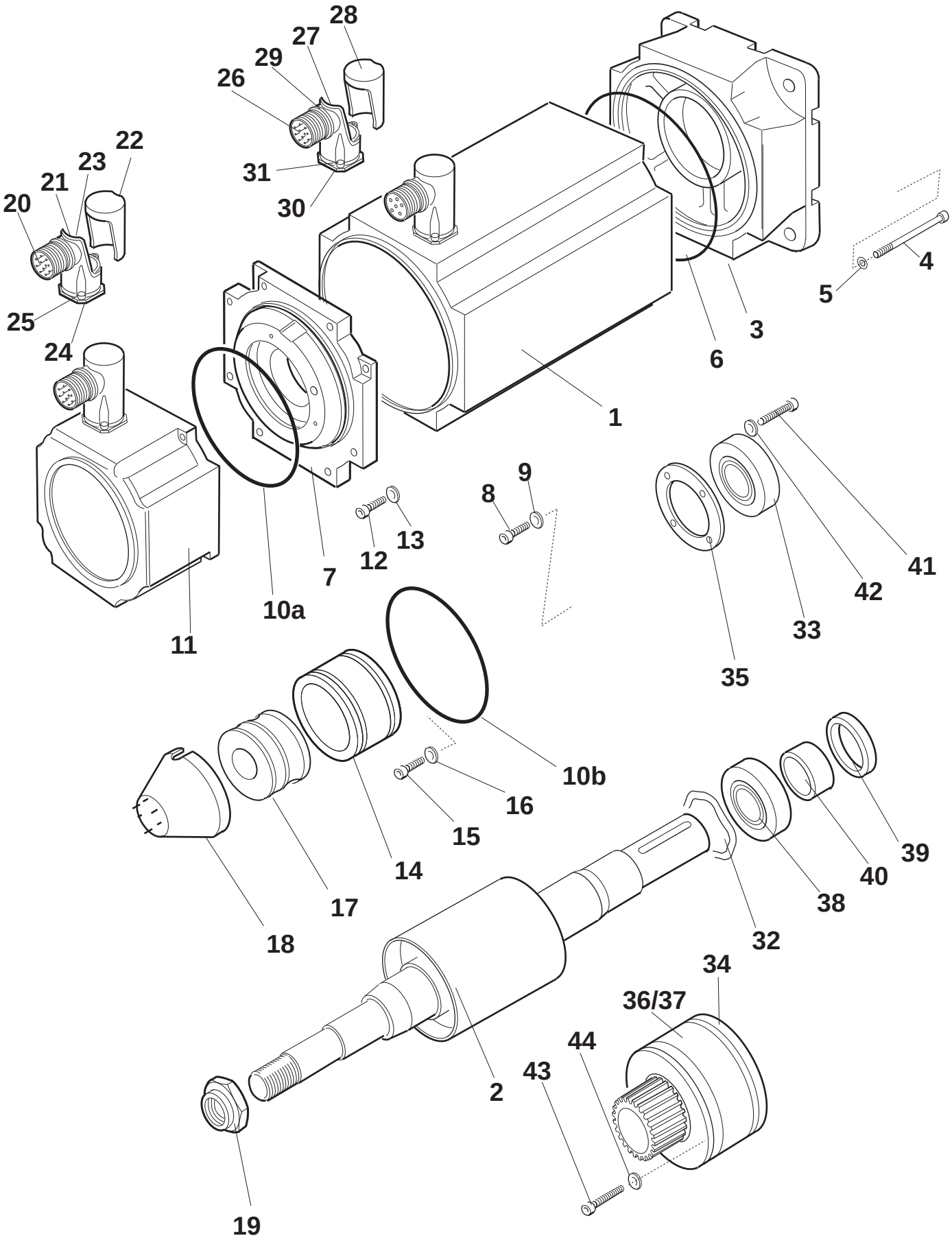

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HJ116 PARTS LIST

1 Motor Body
2 Motor Rotor
3 DE Cover
4 DE Cover fixing screws
5 Washers for DE cover fixing screws
6 DE Cover O ring
7 NDE Cover
8 NDE Cover fixing screws
9 Washers for NDE cover fixing screws
10 NDE Cover O ring
11 Enclosing Cover
12 Enclosing Cover fixing screws
13 Washers for Enclosing Cover fixing screws
14. Resolver stator } Note that resolver is shown but that
15. Resolver stator fixing screws } various types of encoders may be
16. Resolver stator clamping washers } fitted. Contact SEM for relevant
17. Resolver rotor } servicing and setting procedures for
18. Resolver protective shield } the particular type of encoder involved.
19 Shaft nut
20 Feedback Connector multi pin plug
21 Feedback Connector rear gasket
22 Feedback Connector rear cover
23 Feedback Connector housing
24 Feedback Connector bottom gasket
25 Feedback Connector housing fixing screws
26 Power Connector multi pin plug
27 Power Connector rear gasket
28 Power Connector rear cover
29 Power Connector housing
30 Power Connector bottom gasket
31 Power Connector housing fixing screws
32 Wave Washers
33 NDE Bearing
34 Brake Hub (optional)
35 Bearing Clamp plate
36 Brake stator (optional)
37 Brake Rotor (optional)
38 DE Bearing
39 Shaft seal
40 Retaining Collar
41 Fixing Screws for bearing clamp plate
42 Washers for bearing clamp plate screws
43 Fixing screws for brake stator (optional)
44 Washers for brake stator fixing screws (optional)

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HJ(T)155

servicing instructions

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1.2 Servicing of SEM motors must be done only by suitably trained and qualified personnel, and only after such motors have been electrically isolated and removed from their mechanical drives.

1.3 The jaws of any vice or clamp must be suitably protected when used to grip any part of the motor.

1.4 When separating the motor end covers from the motor body, care must be taken to avoid damage to their mating surfaces.

NOTE. There are strong magnetic forces between the stator and the rotor of all SEM servomotors. Fingers should be kept clear of the gaps between the stator and end covers during assembly and disassembly of the rotor.

1.5 Dismantled components awaiting reassembly, should be kept in a safe, clean and dry location.

1.6 Various types of encoder are used, involving different procedures for dismantling, reassembly, connection, setting up and testing. Contact SEM with regard to relevant serving procedures for the particular type of encoder involved.

2 MARKING

The following relationships must be marked with a marker pen or other suitable method before dismantling.

2.1 Drive end (DE) cover (3) to motor body (1).

2.2 Enclosing Cover (11) to non-drive end (NDE) cover (7).

2.3 Non-drive end cover to motor body.

2.4 Prior to resolver dismantling, mark outside end faces of resolver stator (14) and resolver rotor (17)

3 DISCONNECTION

If servicing work is required on the feedback connector or if the resolver stator (14) is to be completely removed, then proceed as follows: (Otherwise proceed to Section 4-Dismantling)

3.1 Undo the screws and prise off the rear cover (22) of the feedback connector, to allow access to the connector pins. If an appropriate SEM pin connection diagram is not available, record the pin positions on the connector.

3.2 Using a special pin removal tool, (available from SEM), withdraw the pins.

3.3 If it is necessary to remove the resolver stator (14) and its wiring from the motor completely; remove 4 screws (25) and remove the feedback connector housing (23) from the enclosing cover (11). Remove 4 screws (12), and, while carefully drawing the enclosing cover (11) off the NDE cover (7) draw the wiring through the hole in the enclosing cover.

4 DISMANTLING

4.1 If above procedures 3.1, 3.2. and 3.3 are not necessary, start by removing 4 screws (12) and partly drawing off enclosing cover (11), far enough to give access to the thermal sensor leads. Disconnect these leads at their in-line connector

4.2 With the enclosing cover hanging by the wiring, remove the plastic shield (18) from the resolver. Then mark the outward facing end faces of the resolver stator (14) and resolver rotor (17 , recording their relative angular positions (operation 2.4).

4.3 After removing 3 screws (15) and clamping washers 16, carefully remove the resolver stator from the NDE cover (7) and from the resolver rotor.

4.4 Remove the enclosing cover (11) together with the resolver stator (14), and the feedback connector (if still attached), taking care not to damage the wiring.

4.5 While firmly holding the motor DE shaft extension (if no brake used), unscrew and remove shaft nut (19). Then carefully remove the resolver rotor (17).

4.6 Remove 8 screws 4 and while firmly holding the motor body, pull out from the DE the motor rotor complete with the DE cover (3) and the brake stator (36). (if fitted). If a brake is used, initially pull the rotor partially out to give sufficient access to the brake leads. Then disconnect these leads at their in line connector.

4.7 Remove 6 screws (41) holding the bearing clamp plate (35) to the DE cover, then pull this cover away from the clamp plate or from the brake and off the DE bearing. Remove the shaft seal (39) and O Ring (6) from the DE cover.

4.8 Using a suitable bearing extractor tool, remove the DE bearing and its retaining collar (40) from the shaft. Similarly remove the NDE bearing.

4.9 Remove the bearing clamping plate (35) or the brake stator from the motor rotor and (only if necessary) remove the brake rotor from the shaft.

4.10 Remove 4 screws (8) and pull back the NDE cover (7) from the motor body. Disconnect the earth lead at its terminal on this cover and carefully avoid damage to leads passing through this cover. Remove O Ring (10) and wave washers (32) from this cover.

5 RE-ASSEMBLY.

Note: As standard procedure during reassembly, circlip, shaft seal and all bearings, and O Rings MUST be renewed to SEM specification.

5.1 Fit new O Rings (6) and (10) to DE and NDE covers respectively.

5.2 Fit new DE bearing (38) onto the bearing recess in DE cover (3)

5.3 Fix brake stator (36) (if used) to the DE cover, with brake leads uppermost, using 6 long screws (43) and washers (44) to clamp the bearing.

5.4 If no brake is fitted, fix bearing clamp plate (35) to the DE cover with screws (41) and washers (42).

5.5 If a brake rotor has previously been removed from the shaft, it should be pressed back onto the shaft next.

5.6 While holding the motor shaft vertically, with the DE uppermost, feed the DE bearing (38) onto its seating on the shaft. At the same time, if a brake is used, carefully mesh the brake stator teeth with the brake rotor teeth and gently press the brake stator into position.

5.7 Using a sleeve and taking care to keep the collar square to the shaft, press the collar, feed the retaining collar (40) onto the DE shaft extension and while supporting the

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NDE of the shaft, press this collar along the shaft until the DE bearing (38) is hard against its shoulder on the shaft. Also fit NDE bearing to the shaft.

5.8 Offer the NDE cover to the motor body and reconnect thermal sensor leads at their in line connector. Also reconnect the earth lead to its terminal on the cover.

5.9 Fix the NDE cover (7) to the motor body with 4 screws (8) and washers (9)

5.10 Place two wave washers (32) in the bearing recess in the NDE cover (a smear of grease or a tilting of the motor body will hold them in position).

5.11 If no brake is used, fully insert the motor rotor into the drive end of the motor stator, carefully locating the NDE bearing (33) into the recess in the NDE cover.

5.12 If a brake is used, partially insert the motor rotor into the motor stator, leaving adequate access to the brake connections. Reconnect these leads at their inline connector and press them into a safe position. The fully insert the motor rotor into the motor stator, carefully locating the NDE bearing (33) into the bearing recess in the NDE cover.

5.13 Locate the DE cover in accordance with marks made in operation 2.1 and fix this cover to the motor body with 8 screws (4) and washers (5).

5.14 Feed resolver rotor (17) on to the NDE shaft extension, with marks made in operation 2.4 on the outward side as before. Then fix this rotor in position with the shaft nut (19).

5.15 Feed the resolver stator (14) over the resolver rotor, with marks made in operation 2.4 on outward side as before. Then fix the stator to the NDE cover (7) with screws (15) and their clamping washers (16) (with washer flanges on the inward side).

5.16 Re-connect the thermal sensor leads at their in line connector.

5.17 If pins have not been removed from the feedback connector, proceed to section 6 - “Resetting resolver position after re-assembly”. Otherwise if pins have been removed, proceed as follows:

5.18 Feed leads from the resolver stator and from the thermal sensor through the connector hole on enclosing cover (11). Then feed this wiring through connector housing (23) and gaskets (24) and reassemble this housing onto enclosing cover (11)

5.19 Press the pins back until they click into their previous positions in connector plug (20). then fix this plug, gasket 921) and rear cover (22) on to housing (23).

6 RESETTING THE RESOLVER.

6.1 This only applies to a standard resolver supplied by SEM with the standard setting. For any other resolver, refer to the drive manufacturer.

6.2 For these procedures it is necessary to make connections and links to feedback connector pins. To avoid damage to these pins, it is advisable to make such connections and links via a suitable separate test socket which mates with the feedback connector multi-pin plug (20) and which has short leads connected to its sockets. Alternatively appropriate pins can be made available for connections and links by withdrawing them from plug (20) as in Section 3 “Disconnection”.

6.3 If a brake is used, it must be temporarily held off during this operation by applying a 24V dc supply across the brake terminals.

6.4 Undo 4 screws (12) and pull back the enclosing cover (11) to give access too the resolver.

6.5 With the above test plug connected to the feedback connector, link pins R1 to S3 & pins R2 to S2. Connect a signal generator (approx 5V 6kHz) between pins R1 and R2. Connect an AC voltmeter between pins S1 and R2

6.6 At the power connector, link motor phase pins V and W and then connect a low voltage dc supply to motor phases at power connector pins U (+ve) and V+W (-ve). Adjust this voltage to give between 25% and 100% of motor rated current thereby causing the motor to turn to a preferred position.

6.7 Slacken the 3 screws (15) holding the resolver stator and then rotate it until the voltmeter gives a maximum reading. Reconnect the AC voltmeter to pins S4 and R2. Make a small final adjustment of the resolver stator to get a minimum reading. Retighten the screws, disconnect the test socket, the supplies, the voltmeter and links, let the brake (if used) be re-applied.

6.8 Attach the protective shield (18) to the resolver and fix the enclosing cover (11) to the NDE cover in accordance with marks made in operation 2.2.

7 ELECTRICAL TESTS NECESSARY BEFORE CONNECTING MOTOR TO AMPLIFIER:

7.1 Measure motor stator winding resistances U-V, VW, W-U. These must be equal to within 3%.

7.2 Check dielectric strength by flash test at 1000 Vac from:

a Phase U (power connector pin) U to motor body.

b Phase U to thermal sensor (feedback connector pins Thermal Sensor + and Thermal Sensor -

c Phase U to brake connections (power connector pins B+ and B-).

If flash test is not possible then check that insulation resistance is greater than 1megaohm.

7.3 Check dielectric strength by flash test at 500Vac or with a 500V dc from motor body to:

a Brake connections B + B - (power connector pins + and -)

b Thermal sensor (feedback connector pins Thermal sensor + and Thermal Sensor -).

c Resolver (feedback connector pins R2 and R1)

If flash test is not possible then check that insulation resistance is greater than 1megaohm.

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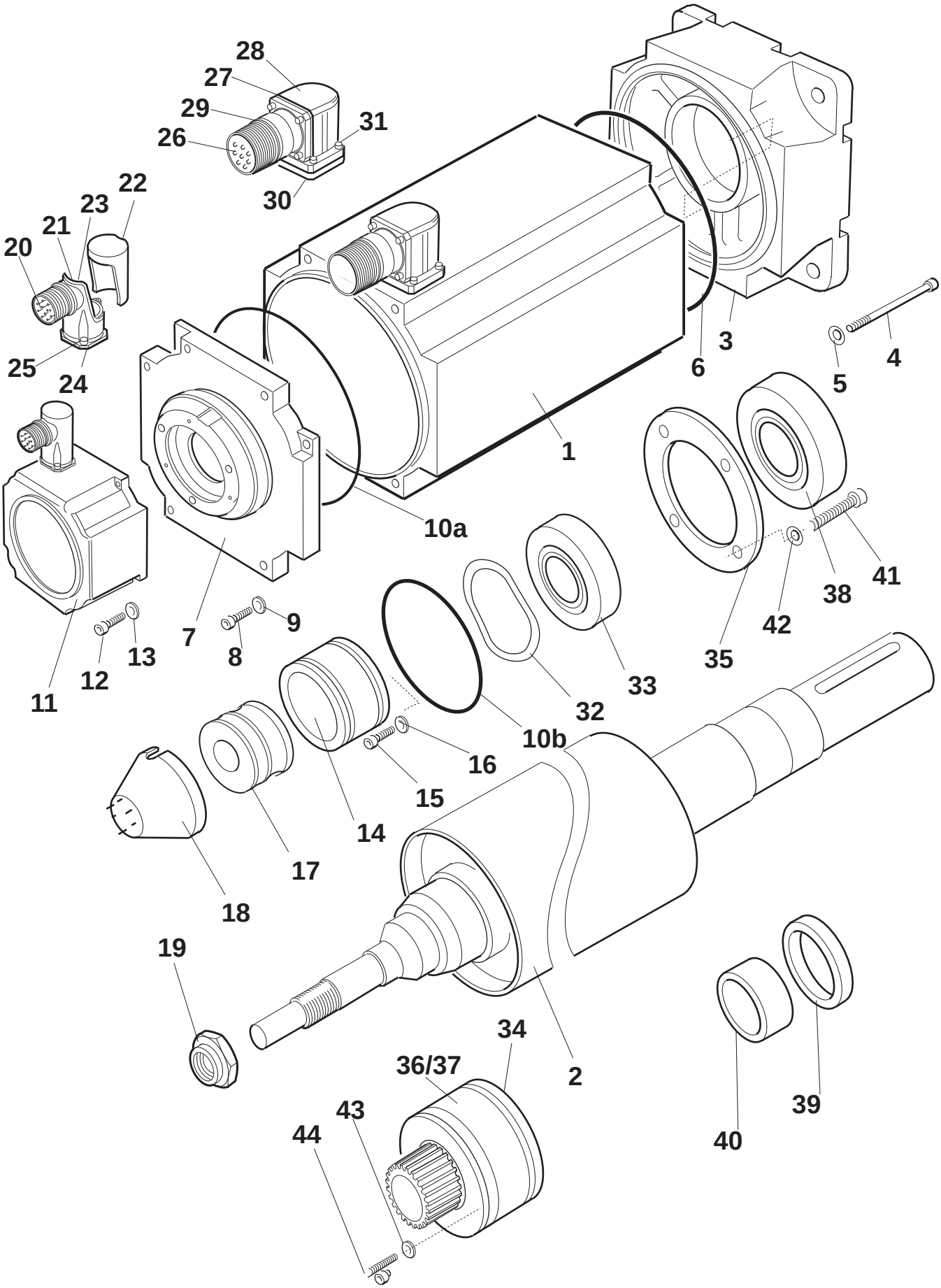
HJ155 Servicing and Maintenance Instructions



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HJ(T)155 PARTS LIST

1 Motor Body
2 Motor Rotor
3 DE Cover
4 DE Cover fixing screws
5 Washers for DE cover fixing screws
6 DE Cover O ring
7 NDE Cover
8 NDE Cover fixing screws
9 Washers for NDE cover fixing screws
10 NDE Cover O ring
11 Enclosing Cover
12 Enclosing Cover fixing screws
13 Washers for Enclosing Cover fixing screws
14. Resolver stator
15. Resolver stator fixing screws
16. Resolver stator clamping washers
17. Resolver rotor
18. Resolver protective shield

} Note that resolver is shown but that various types of encoders may be fitted. Contact SEM for relevant servicing and setting procedures for the particular type of encoder involved.

18 Resolver protective shield
19 Shaft nut
20 Feedback Connector multi pin receptacle
21 Feedback Connector rear gasket
22 Feedback Connector rear cover
23 Feedback Connector housing
24 Feedback Connector bottom gasket
25 Feedback Connector housing fixing screws
26 Power Connector multi pin receptacle
27 Power Connector rear gasket
28 Power Connector rear cover
29 Power Connector housing
30 Power Connector bottom gasket
31 Power Connector housing fixing screws
32 Wave Washers
33 NDE Bearing
34 Brake (optional)
35 Bearing Clamp plate
36 Brake stator (optional)
37 Brake rotor (optional)
38 DE Bearing
39 Shaft seal
40 Retaining Collar
41 Fixing Screws for bearing clamp plate
42 Washers for bearing clamp plate screws
43 Fixing screws for brake stator
44 Washers for brake stator fixing screws

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WARNING

Servomotors contain magnetic material which will attract metal particles. Care should be taken when dismantling motors to avoid this.

All A.C. servomotors manufactured by SEM contain magnets which are air stable and can be dismantled without demagnetisation

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